Digital Lynx SX Upgrade

User's Manual

Upgrade for compatibility with the HS-xx-mux Headstage

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1 Document Overview

This document explains how to upgrade your Digital Lynx SX for compatibility with the multiplexing headstage. The additional hardware and software requirements are outlined and there is a glossary at the end of the document.

2 HS-xx-mux Overview

The multiplexing headstage is a multiplexing headstage that records from up to 64 individual electrodes. The physiological signals are digitized at the headstage, meaning the required number of cable conductors is greatly reduced.

Features:

- Versions include HS-32-mux and the HS-64-mux.
- ±5mV Input Range.
- >80dB Common Mode Rejection Ratio(CMRR) at 60Hz.
- <2.5μV_{RMS} Noise (0.1Hz to 9kHz).
- Interfaces directly with Digital Lynx SX.
- 25 Conductor Cable transfers up to 64 channels to Digital Lynx SX.
- Up to 128 Digital Channels per Digital Lynx SX.
- Compatible with Neuralynx EIBs.

2.1 Important Note

The multiplexing headstage must be connected to the Digital Lynx SX before the system is powered ON. Otherwise the system won't recognize that a multiplexing headstage is present.

3 What's included with the Digital Lynx SX multiplexing headstage Upgrade?

3.1 Multiplexing Headstage Adapter

The Multiplexing Headstage Adapter is the interface between the multiplexing headstage and the Digital Lynx SX. It allows for up to 2 HS-64-mux (128 Digital Channels) to be connected to the Digital Lynx SX. The Multiplexing Headstage Adapter is provided with a new Digital Lynx SX Motherboard Faceplate.

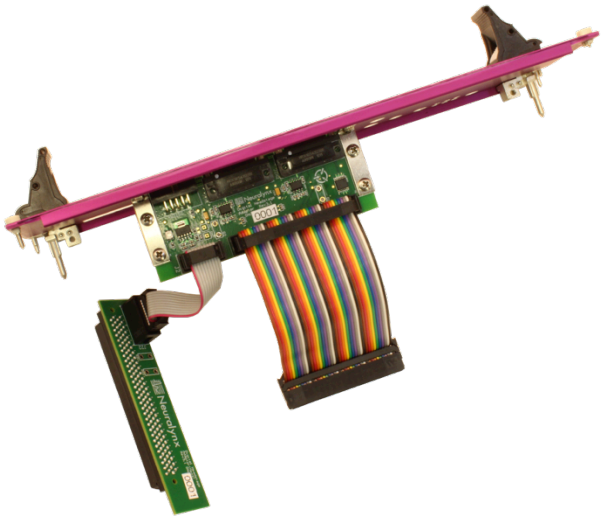

Figure 3-1 Digital Headstage Adapter

3.2 Additional Testing Items

Additionally, a Signal Mouse (SM-32/64) and an Impedance Plug (HS-36 Impedance Plug), can be purchased as separate items for testing the signal through the multiplexing headstage and the Digital Lynx SX.

3.2.1 SM-32/64

- Interface for driving test signals into the multiplexing headstage.
- Switches control Bank 1, Bank 2, Bank 3, Bank 4, and the Reference.

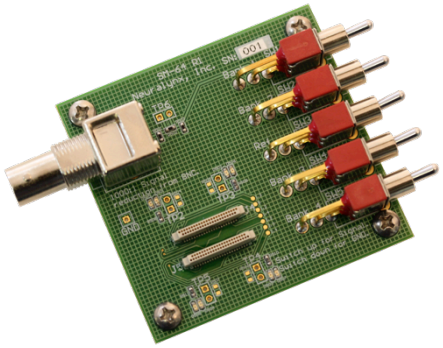

Figure 3-2 SM-64

3.2.2 HS-36 Impedance Plug

- Test plug with different resistance values on each bank of eight channels.

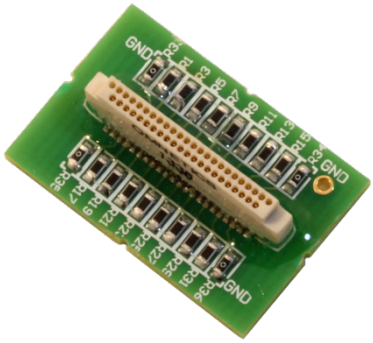

Figure 3-3 HS-36 Impedance Plug

3.3 Electrostatic Sensitive Equipment

All Neuralynx Equipment is Electrostatic Sensitive and should be handled with appropriate measures. Always wear a static strap and use all appropriate ESD measures when handling any electronics. Please contact Neuralynx for detailed information if you have questions.

4 Installing the Upgrade Hardware

4.1 Special Tools Required

1. Phillips-head Screwdriver.

4.2 Protect Against Electrostatic Discharge

While installing the Digital Headstage Adapter, it is extremely important to protect the Digital Lynx SX from electrostatic discharge. For this reason a static wrist strap is provided with the Digital Headstage Adapter. Properly ground yourself before handling any electronics using the following instructions.

1. Open the package containing the Static Wrist Strap, Cord, and Alligator Clip.
2. Connect the banana plug end of the cord to the socket on the back of the Digital Lynx SX labeled *Gnd*. Refer to the figure below.

Figure 4-1 Connect the Cord to the Digital Lynx SX

3. Guide the Cord toward the front of the Digital Lynx SX.
4. Attach the other end of the Cord to the snap on the Static Wrist Strap. Refer to the figure below.

Figure 4-2 Connect the Cord to the Static Strap

5. Wear the Static Wrist Strap on either wrist. Refer to the figure below.

Figure 4-3 Wear the Static Strap

4.3 Disconnect the Digital Lynx SX Motherboard

1. Disconnect any cables connected to the front of the Digital Lynx SX.
2. With a Phillips-head screwdriver loosen the two screws securing the Digital Lynx SX Motherboard to the Digital Lynx SX. These screws are outlined in the figure below.

Figure 4-4 Loosen Two Screws

3. Press the white release button on the top and bottom latch of the Digital Lynx SX Motherboard. Push the top latch up and the bottom latch down to eject the Digital Lynx SX Motherboard from the Digital Lynx SX.

Figure 4-5 Eject the Digital Lynx SX Motherboard

4. Slowly slide the Digital Lynx SX Motherboard about halfway out of the Digital Lynx SX. Up to three connectors need to be disconnected before completely removing the Digital Lynx SX Motherboard.
5. Remove the optical fiber cable from location #1. Refer to the figure below.
6. Remove the optical fiber cable from location #2. Refer to the figure below.
7. Remove the 20 pin ribbon cable from location #3. Refer to the figure below.
    a. NOTE: Some models of the Digital Lynx SX do not have this connection.

Figure 4-6 Disconnection Points

8. Completely remove the Digital Lynx SX Motherboard from the Digital Lynx SX.

4.4 Install the Multiplexing Headstage Adapter

1. Disconnect the ribbon cable attached to the connector labeled *J1* on the Digital Lynx SX Motherboard.
    a. NOTE: Some models of the Digital Lynx SX do not have this connection.
2. Place the Digital Lynx SX Motherboard on a flat solid surface with the LCD Screen down.
3. With a Phillips-head screwdriver loosen and remove the screws securing the Faceplate to the Digital Lynx SX Motherboard. Hold onto these screws, they will be used to secure the new Faceplate to the Digital Lynx SX Motherboard.

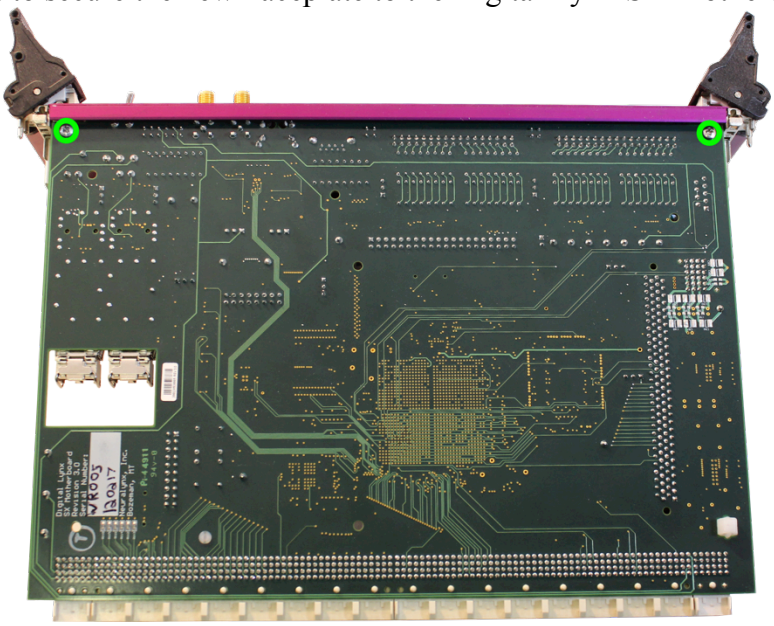

Figure 4-7 Remove Faceplate Screws

4. Remove the Faceplate from the Digital Lynx SX Motherboard. This Faceplate is yours to keep.
    a. Note: This is a tight fit, care should be taken not to stress the Digital Lynx SX Motherboard while doing this.
5. Slide the new Faceplate, with Multiplexing Headstage Adapter provided attached, onto the front of the Digital Lynx SX Motherboard.
    a. Note: This is a tight fit, care should be taken not to stress the Digital Lynx SX Motherboard while doing this.
6. Secure the Faceplate to the Digital Lynx SX Motherboard with the original screws.
7. Connect the part of the Multiplexing Headstage Adapter labeled *Digital Headstage Adapter(Mezz)* to the connector labeled *J2* on the Digital Lynx SX Motherboard. Refer to the figure below.

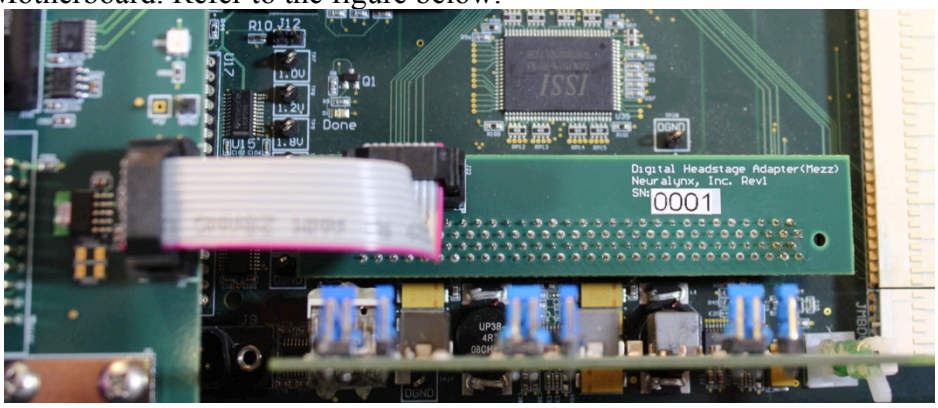

Figure 4-8 Multiplexing Headstage Adapter(Mezz) Connection

8. Connect the 40 pin ribbon cable attached to the Multiplexing Headstage Adapter to the connector labeled *J1* on the Digital Lynx SX Motherboard. Refer to the figure below.

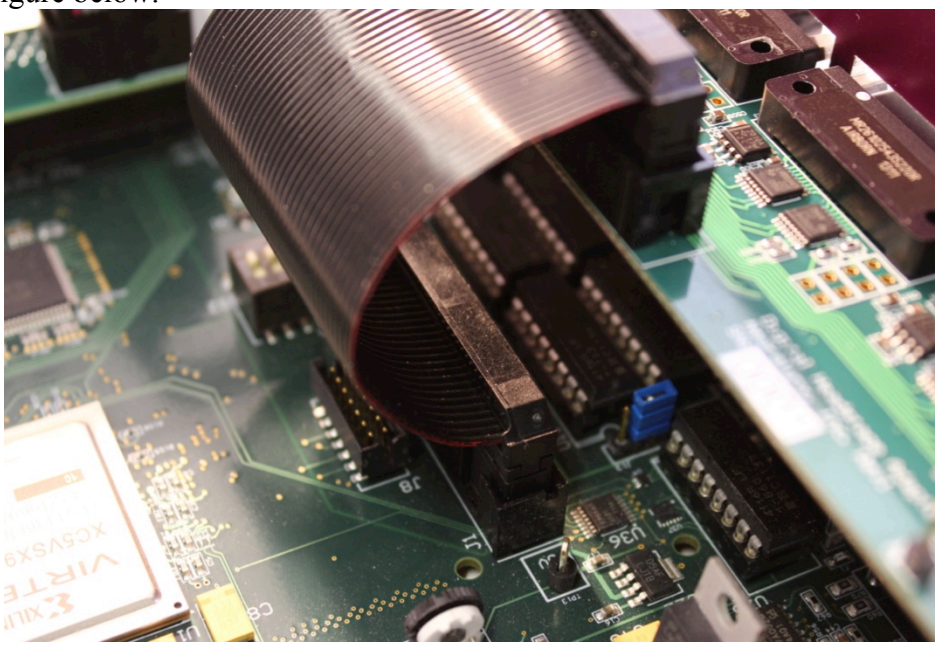

Figure 4-9 40 Pin Ribbon Cable Connection

9. Connect both 2 pin sockets to the TTL Driver headers on Digital Lynx SX Motherboard. The label on each socket needs to face towards the Faceplate. Refer to the figure below.
    a. NOTE: Some models of the Digital Lynx SX do not have this connection.

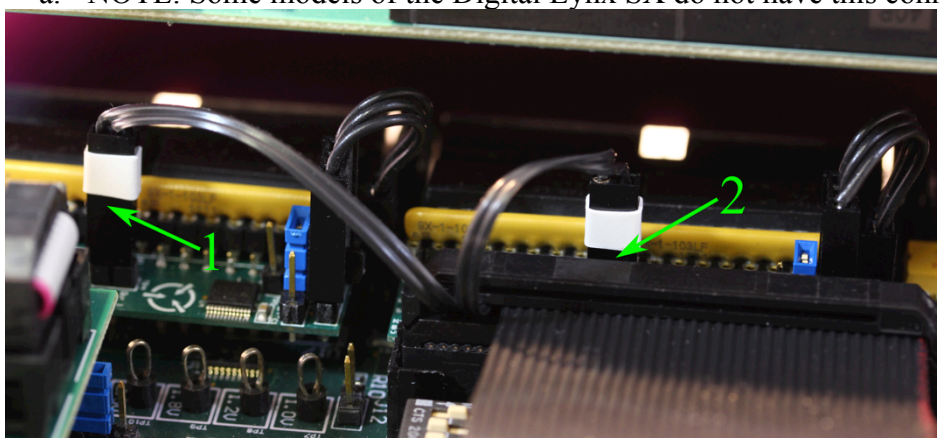

Figure 4-10 40 Pin Ribbon Cable Connection

4.5 Reconnect the Digital Lynx SX Motherboard

1. Align the Digital Lynx SX Motherboard on the green card guides and slowly slide it about halfway into of the Digital Lynx SX. Up to three connectors need to be reconnected before completely inserting the Digital Lynx SX Motherboard.
2. Reconnect the optical fiber cable labeled *1* to location #1.
3. Reconnect the optical fiber cable labeled *2* to location #2.
4. Reconnect the 20 pin ribbon cable to location #3.
    a. NOTE: Some models of the Digital Lynx SX do not have this connection.

Figure 4-11 Connection Points

5. Continue sliding the Digital Lynx SX Motherboard into the Digital Lynx SX until it makes contact with the backplane in the Digital Lynx SX.

6. Gently but firmly push on the left side of the Digital Lynx SX Motherboard Faceplate to engage the connectors.
    a. Note: Do not try to force the Digital Lynx SX Motherboard all the way into the Digital Lynx SX.
7. Squeeze the top latch down and the bottom latch up to fully insert the Digital Lynx SX Motherboard into the Digital Lynx SX. Refer to the figure below

Figure 4-12 Digital Lynx SX

5 Installing the Digital Lynx SX Firmware Update

Digital Lynx SX Firmware Update Version 1.30 or later is required to use the multiplexing headstage. The Firmware package can be downloaded from the Neuralynx Website:
Neuralynx.com > *Software* > *Drivers and Firmware* > *Digital Lynx SX Firmware Update Version 1.30*
Instructions for installing the Firmware Update are contained in the download package.

6 Glossary

CSC – Neuralynx acronym for Continuously Sampled Channel.
EIB – Neuralynx acronym for Electrode Interface Board.
Multiplexing Headstage (mux)– Headstage that digitized the physiological signals at the headstage. XX denotes the number of channels (ie. HS-32-mux digitizes 32 physiological signals).